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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/580,671	05/26/2006	Christopher Stuart Cutler	42706-2400	5735

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EXAMINER

GREEN, YARA B

ART UNIT	PAPER NUMBER
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2884

MAIL DATE	DELIVERY MODE
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11/15/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/580,671

Applicant(s)

CUTLER ET AL.

Examiner

Yara B. Green

Art Unit

2884

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 May 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-49 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 22-45, 48 and 49 is/are allowed.
- 6) ☒ Claim(s) 1-21, 46 and 47 is/are rejected.
- 7) ☒ Claim(s) 6 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 May 2006 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>5/26/2006</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Information Disclosure Statement

1. The listing of the reference, GB 2316172, in the specification is not a proper information disclosure statement. 37 CFR 1.98(b) requires a list of all patents, publications, or other information submitted for consideration by the Office, and MPEP § 609.04(a) states, "the list may not be incorporated into the specification but must be submitted in a separate paper." Therefore, unless the references have been cited by the examiner on form PTO-892, they have not been considered.
2. The information disclosure statement filed May 26, 2006 fails to comply with 37 CFR 1.98(a)(3) because it does not include a concise explanation of the relevance, as it is presently understood by the individual designated in 37 CFR 1.56(c) most knowledgeable about the content of the information, of each patent listed that is not in the English language. It has been placed in the application file, but the information referred to therein has not been considered.

Drawings

3. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the flange of claims 20 and 44 and the memory of claims 21 and 45 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed

from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

4. Claim 1 and 22 are objected to because of the following informalities: As per claim 1, it is suggested to include the acronym (pcb) after the phrase "printed circuit board" in the last line since the acronym is used in the claims following. As per claim 22, it seems that the characters "4a" are inadvertently included in line 4 and should be deleted. Appropriate correction is required.

5. Claims 23-25 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claim 22 recites the range of the height to width ratio of being between 0.1 and 0.7. Claims 23 - 25 recite an open-ended range, in which the ratio values are only to be greater than a minimum value.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claim 5 recites the limitation "electronics housing". There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 1, 4, 5, 7-12 and 17 rejected under 35 U.S.C. 103(a) as being unpatentable over Wong (US Patent No. 5,721,430; published February 24, 1998).

Re **claim 1**, Wong discloses a gas sensor comprising a cavity **100** for containing a gas (col. 26, lines 1-2); means for generating radiation **84** which is transmitted through the cavity **100** (col. 26, lines 20-21) and including one or more wavelengths which is absorbed in use by a gas to be detected (col. 26, lines 36-38); and a detector **4,5,6** for detecting radiation which has passed through the cavity **100**, the detector **4,5,6** having a surface area which is visible to the interior of the cavity **100** (col. 26, lines 39-47), the walls of the cavity **100** being sufficiently reflective to the radiation that the cavity **100** is substantially illuminated with the radiation (col. 26, lines 6-7), such that the visible surface area of the detector **4,5,6** is illuminated with substantially unfocussed radiation (col. 26, lines 44-47), wherein the radiation generating means **84** and/or detector(s) **4,5,6** is mounted on a printed circuit board **11** (col. 23, lines 6-8) and is surrounded by resilient protection **32** (col. 16, lines 48-52).

Although Wong does not disclose the material used as the protection around the circuit board, the materials can easily include metals or plastics that are resilient in nature. Therefore, one of ordinary skill in the art would have been motivated to use materials that are well known in the art (i.e. metals, plastics) as the protection of the elements on the printed circuit board which inherently having resilient qualities.

Re **claim 4**, Wong discloses a sensor according to claim 1, wherein the pcb **11** and the components mounted thereon are located in an electronics housing **42** having an upper wall, the upper surface of which defines a wall of the cavity (col. 26, lines 17-20; col. 21, lines 13-16).

Re **claim 5**, Wong discloses the resilient member and the electronics housing being mounted together (figure 18, col. 16, lines 46-53) but is silent as to the manner in which there are mounted. It would have been obvious to one of ordinary skill in the art to maintain an alignment between these elements, as market pressure would require the elements to remain intact in order to perform correctly. This alignment can be maintained by those methods well known in the art (threaded/screw mechanism, adhesive, interengaging key locks, welding, flanges, etc).

Re **claim 7**, Wong discloses a gas sensor according to claim 1, where in the entire visible surface area of the detector **4,5,6** is illuminated with substantially unfocussed radiation (col. 26, lines 44-48).

Re **claim 8**, Wong discloses a gas sensor according to claim 1, wherein increasing the visible surface area of the detector **4,5,6** relative to the surface area of the cavity walls **100** increases the signal to noise ratio detected by the detector **4,5,6** (col. 11, lines 11-40).

Re **claim 9**, Wong discloses a sensor according to claim 1, wherein the radiation generating means **84** generates infra-red radiation (col. 26, lines 20-21).

Re **claim 10**, Wong discloses a sensor according to claim 1, wherein the infra-red radiation generating means comprises a heating element to heat gas within the cavity **100** so as to cause the gas to generate infra-red radiation (col. 26, lines 35-40).

Re **claim 11**, Wong discloses a sensor according to claim 1, further comprising one or more additional radiation detectors **4, 5, 6** each detector being adapted to sense radiation centered on a respective, different wavelength (col. 26, lines 25-310).

Re **claim 12**, Wong discloses a sensor according to claim 1, wherein the cavity wall defines a window **7** allowing radiation to pass therethrough to the one or a respective detector **4,5,6** (col. 21, lines 13-18).

Re **claim 17**, Wong discloses a sensor according to claim 1, wherein the cavity is tubular, for example cylindrical, and has substantially planar end walls (col. 26, lines 1-5, figure 20).

10. **Claims 2 and 3** are rejected under 35 U.S.C. 103(a) as being unpatentable over Wong (US Patent No. 5,721,430; published February 24, 1998) and further in view of Diekmann et al. (US Patent No. 6,989,549; filed May 5, 2003).

Re **claim 2**, Wong teaches the limitations of claim 1, as mentioned previously and further disclose wherein the resilient protection member comprise a resilient member having one or more apertures **34** for which the detector and radiation generating means use to communicate with the gas. However, Wong does not teach the radiation and detector elements extending through the apertures. In the same field of endeavour, Diekmann et al. teach the detection and radiation elements extend through the aperture (col. 4, lines 40-42, figure 1). One of ordinary skill would have been motivated to place the detection and radiation elements in such a manner that they extend

through the apertures of Diekmann et al. in the apparatus of Wong so to ensure fewer obstructions in the optical path of the radiation between the gas/walls and the detector/radiation source.

Re **claim 3**, Wong, as modified by Diekmann et al., teach the limitations of claim 2, as mentioned above. Diekmann further teaches wherein the radiation generating means and/or respective detectors extends in a close fitting relationship through the apertures (see fig. 1).

11. **Claims 13 – 15** are rejected under 35 U.S.C. 103(a) as being unpatentable over Wong (US Patent No. 5,721,430; published February 24, 1998) and further in view of Sun et al. (US Patent No. 6,469,303; published October 22, 2002).

Wong discloses the cavity walls to be highly reflective but does not require the application of a coating. In the same field of endeavour, Sun et al. teach applying a gold coating to the cavity walls in order to increase reflectance, where it is well known in the art that gold has a reflectivity greater than 95% in the infrared band. (col. 4, lines 1-7). It would have been obvious to one of ordinary skill in the art to coat the majority of the walls to ensure high signal which would involve coating the largest percentage (i.e. more than 90%) of the walls as is feasible without inhibiting the performance of the detector.

12. **Claim 16** is rejected under 35 U.S.C. 103(a) as being unpatentable over Wong (US Patent No. 5,721,430; published February 24, 1998) and further in view of Rogalski et al. ("Infrared devices and techniques", published 2002)

Wong teach the limitations of claim 1, as mentioned above, but does not applying a transparent coating to the metallic cavity walls (col. 26, lines 1-5). In a similar field of endeavour, Rogalski et al. teach that the mirror optics (i.e. the reflective cylindrical walls, as can be used in gas

sensors (sect. 7.0), must be coated with protective coating in order to prevent them from tarnishing (sect. 2.7). One of ordinary skill in the art would have been motivated to coat the metallic walls of the cavity with a transparent coating so not to interfere with the reflectivity of the metal, as disclosed by Rodalski et al., in the apparatus of Wong in order to preserve the integrity of the optics.

13. **Claims 18-21** are rejected under 35 U.S.C. 103(a) as being unpatentable over Wong (US Patent No. 5,721,430; published February 24, 1998) and further in view of Starta et al. (US PreGrant Pub. 2004/0209507; filed May 31, 2002).

Re **claim 18**, Wong teaches the limitations of claim 1, as mentioned above. Wong does not teach an outer housing for the gas sensor. In a similar field of endeavour, Starta et al. teach a housing to be used in the presence of potentially flammable gases. Starta et al.'s housing has at least one aperture to allow gas to enter the housing (para 0041). One of ordinary skill in the art would have been motivated to enclose the apparatus of Wong in the housing of Starta et al. in order to permit gas to flow into the sensor cavity and ensure that apparatus is safely housed in the event that the gases being measured ignite.

Re **claim 19**, Wong, as modified by Starta et al., teach the limitations of claim 18, as mentioned above. Starta et al. further teach wherein the outer housing comprises a flame arrestor (para. 0041).

Re **claim 20**, Wong, as modified by Starta et al., teach the limitations of claim 19, as mentioned above. Starta et al. further teach wherein the flame arrestor is secured to an outer surface of the a housing having at least one aperture, the housing defining a wall of the cavity, by a flange that overlaps the flamer arrestor, whereby the cavity housing is assembled in the outer housing, the

flange defines the thickness of a gas chamber communicating with the apertures in the outer and cavity housing (figure 5b, see structures and element 260).

Re **claim 21**, Wong, as modified by Starta et al., teach the limitations of claim 18, as mentioned above. Wong further teaches a memory, such as an EEPROM, located within the outer housing for storing calibration data, the memory being coupled with electrical contacts (col. 23, lines 5-8, lines 65-68). The housing of Starta et al. ensure that the electrical contacts for the memory in the apparatus of Wong will be coupled to pins accessible from the outer housing (para. 0036). One of ordinary skill in the art would be motivated to enclose the apparatus of Wong in the housing of Starta et al. in order to ensure a flame-proof apparatus that is still able to electrically couple outside of the protective outer housing.

Re **claim 46**, Wong discloses the limitations of claim 1, as mentioned above. Wong further teaches a method of constructing a gas sensor according to claim 1, the method comprising: (a) a tubular, optical housing, closed by a wall at one end, except for at least one gas access aperture (col. 26, lines 1-5); (b) inserting a radiation source and detector on a printed circuit board (col. 26, lines 17-20; col. 21, lines 13-16) into a tubular electronics housing, the electronics housing having an end wall closed at one end except for (col. 26, lines 38-47) one or more apertures (col. 21, lines 13-16) to allow access to the source and detector (col. 26, lines 38-47); (c) mating the electronics housing with the optical housing so that it defines therewith a substantially closed optical cavity between the end walls of the electronics and optical housings and in which a gas to be sensed is located in use (col. 26, lines 18-21; lines 36-51). Wong does not teach an outer housing for the gas sensor. In a similar field of endeavour, Starta et al. teach (a) a tubular housing closed at its end adjacent the closed end of an optical housing, except for at least one gas access opening (para. 0041). One of ordinary skill would have been motivated to insert the optical and electronics housings of Wong into the outer

housing of Starta et al. and secure the assemblies together in order to permit gas to flow into the sensor cavity and ensure that apparatus is safely housed in the event that the gases being measured ignite.

Re **claim 47**, Wong, as modified by Starta et al., teach the limitations of claim 46, as mentioned above. Starta et al. further teaches a method wherein step (d) comprises applying a potting compound to the assembled housing (para. 0037).

Allowable Subject Matter

14. Claim 6 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

15. Claims 22-45, and 48-49 are allowed.

16. The following is an examiner's statement of reasons for allowance: Claim 22 recites the limitation of the ratio of the height to width of the optical cavity is greater than or equal to 0.1 and less than or equal to 0.7. Applicant discloses in lines 1-15 of page 8 of the disclosure that the claimed height to width ratio yields substantially uniform illumination of the cavity. Prior art of record does not disclose such an aspect ratio for the cavity.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion


17. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Herman et al. (US Patent No. 5,495,747) disclose gas sensor having an outer housing with a flame arrestor.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Yara B. Green whose telephone number is (571) 270-3035. The examiner can normally be reached on Monday - Thursday, 8am - 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dave Porta can be reached on (571) 272-2444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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